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ABSTRACT

A study examined whether good and poor readers benefit differentially from intervention in mnemonic strategy use. Subjects, 72 fourth grade males from a suburban public school in the southeast, were randomly assigned to either a training, induction or control group. Training subjects received explicit demonstration of appropriate strategies, while induction subjects were presented with materials that "suggested" the use of targeted strategies, and control subjects received no special instructions. Each subject was individually administered four memory tasks: (1) organization--three 20-item word lists were sorted and recalled; (2) rehearsal--three 20-item word lists were rehearsed and recalled; (3) inference--16 sentences were read, followed by explicit-cued and implicit-cued recall; and (4) story recall--a titled and an untitled story were read and recalled. Subjects were presented with a final set of neutral materials for each task to assess transfer of strategy use. Results indicated that good readers used appropriate strategies more effectively and recalled more information than poor readers. Further, good readers seemed to benefit most from the induction procedure of the organization tasks, while poor readers generally displayed superior strategy use and recall in the training condition. Such findings indicate that good readers benefit most from "learning by doing" in a supportive context, while poor readers perform better with explicit training procedures. (A table of data is attached.) (ARH)

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Good and Poor Readers' Use of Mnemonic Strategies: A Comparison of Training and Induction Procedures

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Abstract

To test whether good and poor readers benefit differentially from experimental intervention in mnemonic strategy use, good and poor reading 4th-grade males were randomly assigned to either a Training, Induction or Control condition. Training subjects received explicit demonstration of appropriate strategies; Induction subjects were presented with materials that "suggested" the use of targeted strategies (e.g., categorized words in an organization task). Control subjects received no special instructions or materials.

Each subject was individually administered four memory tasks: Organization--three 20-item word lists were sorted and recalled; Rehearsal--three 20-item word lists were rehearsed and recalled; Inference--12 sentences were read, followed by explicit-cued (information stated in the sentence) and implicit-cued (information inferred from the sentence) recall; and, Story Recall--a titled (advance organizer) and an untitled story were read and recalled. All subjects were presented with a final set of neutral materials for each task (e.g., for the Organization task, a word list in which the words had no obvious relationship to each other was presented) to assess transfer of strategy use.

Results indicated that good readers used appropriate strategies more effectively and recalled more information than poor readers. Further, good readers seemed to benefit most from the induction procedure in some tasks (i.e., organization), while poor readers generally displayed superior strategy use and recall in the Training condition. Such findings indicate that good readers benefit most from "learning by doing" in a supportive context, while poor readers perform better with explicit training procedures.

AIMS

1. To further explore recent findings by the authors indicating differential strategy use and recall between good and poor readers.

2. To see whether poor readers could be trained to use mnemonic strategies in order to improve recall.

3. To investigate whether good and poor readers required different levels of "support" in their attempts to remember information. More specifically, the question was whether good readers benefit most from induction procedures in which they receive materials that "suggest" targeted strategies without explicit strategy training, while poor readers require direct, explicit training procedures.

Method

Subjects

Seventy-two fourth grade males (mean age = 10.2) from two suburban public schools outside of Winston-Salem, North Carolina, served as subjects. All subjects were approximately middle class, with fifteen black children and fifty-seven white children participating. Subjects were randomly selected from those children whose parents granted permission for their participation in the study and until there were 36 good readers and 36 poor readers. A subject was classified as a good reader if 1) he scored above the 75th percentile on overall reading achievement on the California Achievement Test and 2) he was rated as a good reader by the principal reading teacher. Poor readers were those students who 1) scored below the 50th percentile on overall reading achievement on the California Achievement Test and 2) were rated as poor readers by the principal reading teacher. Children with specific reading disabilities or documented neurological impairments were not included in the study.

Tasks

Each subject was individually presented with the following tasks:

1. In order to obtain a crude measure of IQ, all subjects first were administered the Peabody Picture Vocabulary Test-Revised (Form L).

2. Organization: On this task all subjects were presented with three 20-item word lists (Best & Ornstein, 1986). Subjects were presented with the words on each list one at a time and were instructed to put the words into groups that would help them remember the words. After each list was presented, recall for the words on that list was assessed. Subjects in the Induction condition first received two sets of categorized materials: the first categorized list contained words that were highly related to each other (e.g., cat, dog, cow, horse), and the second list contained words that were related, but the relationships were less obvious (e.g., ladder, nails, paint and ax). Control and Training subjects received unrelated word lists as their first two lists. Training subjects were explicitly taught how to search for relationships among list items and to use those relationships to aid recall. In contrast, control subjects simply were instructed to sort words in a way that would help them remember the words. All subjects were presented with a final transfer list of unrelated words.

3. Rehearsal: Subjects were presented with two different 20-item unrelated word lists for this task. Each subject was presented with the words on a list one at a time and instructed to practice the words aloud, either by themselves or with other words on the list. After the words on a list were presented, recall for that list was assessed. Subjects in the Training condition were taught to use an active rehearsal strategy (Ornstein, Medlin, Stone, & Naus, 1985); that is, they were shown how to practice each word with other words on the list (e.g., cat, dog, horse, rather than cat, cat, cat,

dog, dog, dog). Induction subjects were presented with the words grouped together in order to suggest that the words be rehearsed together. Control subjects received no special training or presentation. In order to assess transfer, on the second list all subjects received ungrouped presentation of list items and no specific instructions concerning strategy use were given.

4. Inference: For this task, subjects were presented with 16 identically structured sentences (i.e., subject, verb, direct object) based on Paris and Lindauer (1976). On the first four sentences, Training subjects were shown pictures of objects implied, but not stated in the sentences (e.g., for the sentence, "the woman swept the floor in the kitchen," the implicit object was a broom). They were then taught to use the implicit information to help them remember the sentences. Induction subjects were asked to act out the first four sentences. The assumption was that they would use the implicit object in their dramatizations, calling attention to it and thus improving its usefulness as a retrieval cue. Control subjects simply were presented with the sentences and asked to read them aloud. In order to assess transfer of strategy use, all subjects were instructed to read the final twelve sentences with no specific instructions concerning strategy use given.

5. Story Recall: For this task, subjects were instructed to read and recall two stories (Brown & Smiley, 1977). Subjects in the Training condition first were presented with an untitled story, but were taught the importance of titles in organizing memory for a story. They were then verbally provided with an appropriate story title. Induction subjects received a titled story, but were given no instructions on how to use the title to aid recall. Control subjects read an untitled story and were given no special instructions. All subjects read and recalled a final untitled story.

Results

Because the four tasks were conceptualized as distinct from each other, they were analyzed separately. Following are the scoring procedures and the results of the statistical analyses for the final transfer list for each task. Means for each task are shown in Table I.

Organization

Scoring. Bousfield and Bousfield's (1966) stimulus category repetition (SCR) scores were used to determine the level of clustering at recall. This method of clustering was selected because observation of recall protocols indicated that the number and pattern of words recalled were very different for good and poor readers and the calculation of the SCR takes into consideration the level of recall. Recall was measured by totalling the number of words recalled minus any repetitions and/or intrusions.

Analyses. A 2(Reading Level) x 3(Condition) MANOVA with SCR and recall as dependent variables revealed a significant reading level main effect (F = 4.85, $p < .01$), but no condition main effect or condition x reading level interaction. Univariate tests revealed that the reading level main effect was significant for both SCR, $F(1, 65) = 7.91$, $p < .01$) and recall, $F(1, 65) = 9.62$, $p < .003$). Inspection of SCR and recall means shows that good readers clustered and recalled more than poor readers on this transfer list. Although the condition main effect was not significant, it is interesting to note that trends for condition effects were in the predicted direction. That is, good readers seemed to benefit more from the induction procedure, while poor readers were aided most by the more explicit training procedure. Further, a significant correlation between SCR and recall, $r = .84$, $p < .00$, suggests that higher levels of recall are related to higher levels of clustering. Further analyses of the initial trials are currently underway and should reveal more specific effects of induction and training than can be seen on the transfer list.

Rehearsal

Scoring. The mean number of unique words rehearsed per rehearsal set (a rehearsal set was considered to begin with the presentation of each new word) was used to determine the type of rehearsal strategy used (Ornstein, Medlin, Stone, & Naus, 1985). For example, a mean number of 1.00 word per set suggests a passive (repetitive) rehearsal strategy, while a mean number greater than 1.00 indicates an active (cumulative) rehearsal strategy. Recall was measured by totalling the number of words recalled, minus any intrusions or repetitions.

Analyses. A 2(Reading Level) x 3(Condition) MANOVA with recall and average words per rehearsal set as dependent variables indicated a significant reading level ($F = 5.37$, $p < .01$) and condition main effect ($F = 8.06$, $p < .000$), but no reading level x condition interaction. Univariate tests showed that the reading level main effect was due to higher recall by good readers than poor ($F = 8.97$, $p < .00$), while the condition main effect was due to the inclusion of more words per rehearsal set in the Training condition. Inspection of means for the average number of words rehearsed indicates that both good and poor readers benefitted from the training intervention. This finding suggests that in a rehearsal task, explicit instructions to rehearse in a more active fashion are required to improve subsequent recall.

Inference

Scoring. Each sentence for this task was structured identically with a subject, verb, direct object and modifying prepositional phrase. The direct objects for each of the sentences were used as explicit cues. Objects appropriate for performance of the actions in the sentences served as implicit cues. A subject was awarded one point if he recalled at least 75%, or three parts, of the sentence (Paris & Lindauer, 1976). A sentence part was considered correctly recalled if either the exact word(s) or a close synonym (e.g., "army man" for soldier) was generated. Further, the original meaning of the sentence had to be retained for a point to be rewarded.

Analyses. A 2(Reading Level) x 3(Condition) MANOVA with implicit-cued and explicit-cued recall as the dependent variables revealed a significant reading level main effect, $F = 3.22$, $p < .05$, but no condition main effect or interaction. Inspection of means indicates that, training seems to facilitate implicit recall for both good and poor readers. Furthermore, good readers also seem to benefit from the induction procedures when given implicit cues and from direct training when given explicit cues. The pattern of means suggests that poor readers need more direct support in a recall situation where important information is implicit.

Story Recall

Scoring. The three stories used for this task were taken from a study by Brown and Smiley (1977) in which subjects rated the relative importance of each pausal unit (point at which a breath naturally is taken) in the story on a scale of 1-4 (with 1 being least important and 4 most important). These importance ratings were used to score recall in the present study. A subject received one point for each pausal unit that was either recalled exactly or closely paraphrased. The total number of units recalled at each rating level was calculated, resulting in four separate story recall scores for each subject. The recall scores are reported in percentages because the number of units at each rating level were slightly different for each story.

Analyses. A 2(Reading Level) x 3(Condition) MANOVA with one-, two-, three- and four-rated pausal units as the dependent variables was conducted. Again, a reading level main effect was significant, $F = 3.64$, $p < .01$, with univariate follow-ups indicating a significant reading level difference for two- and three-rated pausal units. Therefore, it seems that good and poor readers do not differ in their ability to recall the most important elements of a story (e.g., "...climb on my back") and the very detailed (e.g., "He said,") elements. They do differ, however, in their ability to recall supporting details in the story (e.g., "...and away the dragon went"). Mean trends do not follow a consistent pattern across the rating levels, so it

is difficult to predict the level of support required to increase the recall of story units. It is apparent that the small amount of support provided in the present study was not sufficient for poor readers, as evidenced by the fact that the percentage recall for poor readers across conditions was almost the same.

Conclusions

1. Good readers do engage in more effective strategy use, resulting in higher levels of recall, compared to poor readers.
2. For some tasks, such as, organization, it seems that good readers require less support for strategy use than poor readers. In these tasks which perhaps require less integration of materials, "learning by doing" may be more beneficial for good readers. It is possible, however, that both good and poor readers may benefit from more explicit intervention in strategy use in higher level tasks, such as inferencing. At younger ages, all children may require direct training to show improvement in strategy use and recall performance. Moreover, as children advance to higher grade levels, the knowledge-base and strategy use distinctions between good and poor readers may become more apparent, perhaps amplifying the differences in required mnemonic support.
3. While the findings from the present study may be viewed as tentative, analysis of performance on initial trials may provide a clearer picture of the differential degree of mnemonic support required of good and poor readers. Further, inspection of memory protocols in the present study suggests a high level of individual difference in memory performance so that the number of subjects (n=12 per cell) may not have provided sufficient power to detect group differences. Therefore, future efforts will take these questions into consideration.

Table I

Means for all Tasks by Condition and Reading Level (Standard deviations in parentheses)

	Training		Induction		Control	
	Good	Poor	Good	Poor	Good	Poor
1. Organization						
SCR	1.98 (1.75)	1.22 (1.35)	2.73 (2.34)	0.94 (1.20)	1.62 (1.79)	0.86 (1.27)
Recall	7.67 (2.93)	6.25 (3.25)	9.83 (3.83)	5.92 (2.54)	7.08 (3.42)	5.67 (2.19)
2. Rehearsal						
Average words per rehearsal set	3.86 (2.55)	5.01 (3.25)	1.86 (1.68)	1.75 (1.37)	1.48 (1.31)	1.05 (.19)
Recall	6.33 (3.06)	5.33 (1.76)	7.00 (2.30)	4.25 (1.54)	5.83 (1.75)	5.08 (1.98)
3. Inference						
Explicit	4.08 (1.68)	3.92 (1.38)	3.00 (1.54)	3.58 (1.68)	3.25 (1.66)	4.17 (1.70)
Implicit	4.00 (2.89)	3.17 (1.40)	3.50 (1.00)	2.58 (1.51)	3.17 (1.59)	2.50 (1.57)
4. Story Recall (in percentages)						
1-rated pausal unit	.76 (.18)	.71 (.23)	.72 (.12)	.64 (.23)	.66 (.19)	.69 (.25)
2-rated pausal unit	.46 (.22)	.31 (.11)	.53 (.17)	.29 (.19)	.38 (.25)	.29 (.17)
3-rated pausal unit	.47 (.21)	.31 (.17)	.44 (.21)	.30 (.20)	.37 (.20)	.30 (.18)
4-rated pausal unit	.48 (.25)	.45 (.18)	.50 (.18)	.35 (.17)	.53 (.25)	.42 (.20)
Total Recall	.50	.40	.53	.35	.45	.39